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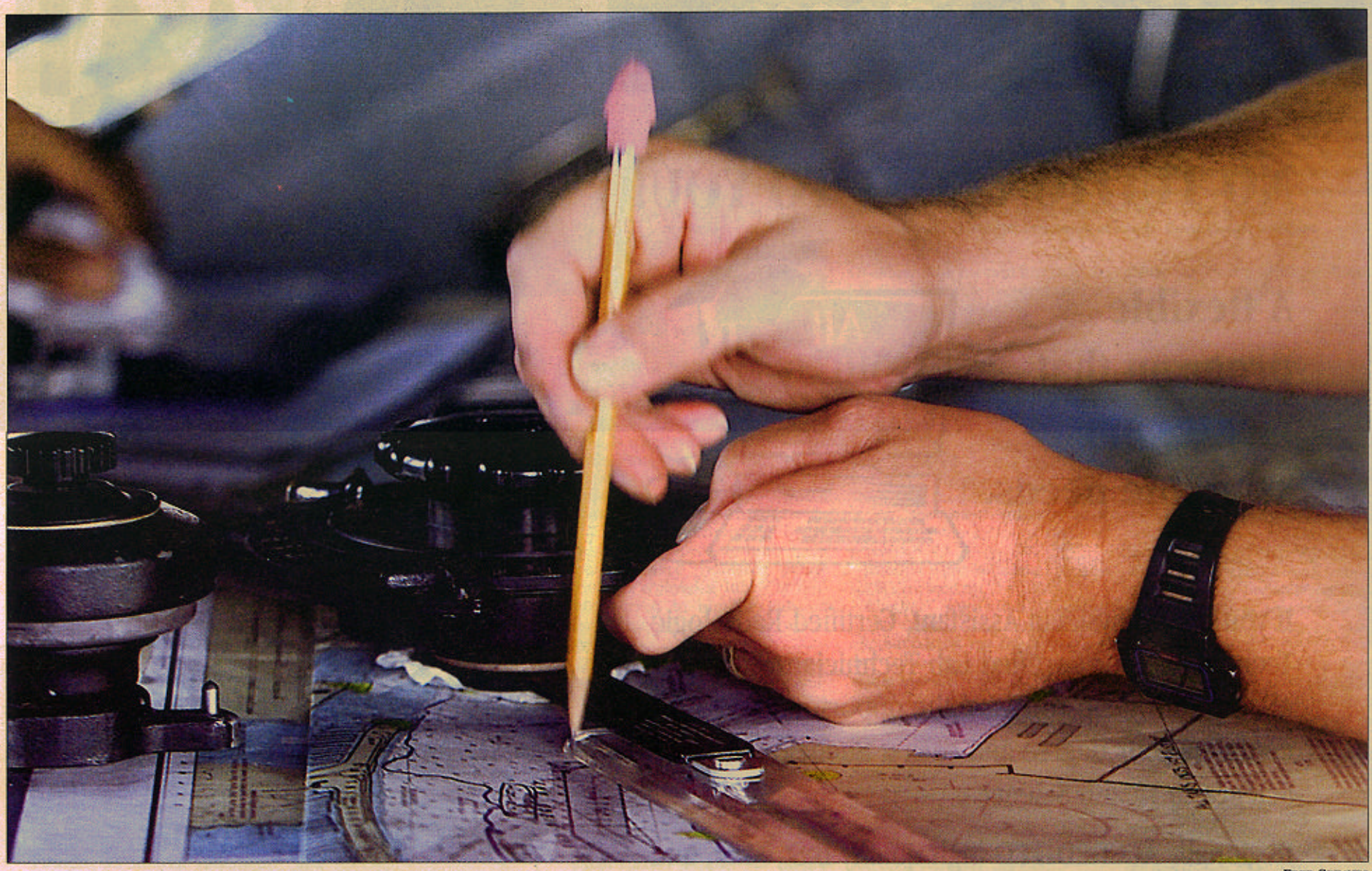

FRED GREAVES

Pencils, sextants and paper charts are used along with Global Positioning Systems to navigate ships today. The Navy may make those tools obsolete.

Stories by Christopher Munsey
Times staff writer

Four or five years from now, paper navigation charts aboard Navy ships might go the way of rum and the lash — disappearing forever into seafaring history.

The replacement looming on the horizon: the Electronic Chart Display and Information System-Navy, a computerized navigation system.

ECDIS-N is meant to chart a course to "paperless" navigation for combatant ships Navywide within three to five years.

Suddenly, it seems, high-technology is erasing the portrait of a navigator hunched over a chart table with a pencil and a pair of dividers, plotting a safe course for his ship. For generations of sailors, that practice underwent little obvious change, a basic seafaring skill from square-rigged sailing ships to battleships to today's Norfolk-based cruiser Monterey.

Now, however, the Monterey and 37 other Navy ships are at the leading edge of a plan to convert all combatants to fully electronic navigation within three years at a total cost of $20 million to $25 million.

Navy leaders are so enthusiastic about electronic navigation's advanced capabilities that they have accelerated the fleetwide implementation target from 2007 to 2004.

"The technology really blossomed in recent years. It kind of snuck up on us," said Rear Adm. Richard D. West, navigator of the Navy, a position created just last January to oversee fleet conversion to paperless navigation.

Converting to electronic navigation in the next few years is important for several reasons, West said, including safer transits, improved war-fighting abilities and interoperability with other Navy ships.

Safety will be improved because radar information will be overlaid on the ECDIS-N screen, of which there can be several on the bridge, combat information center and elsewhere, helping navigators in busy shipping channels.

Electronic navigation is important for war fighting, West said, because pinpointing the ship's exact position improves targeting when launching precision missiles.

Many Navy ships already have some form of electronic navigation equipment, most often a Global Position System bought commercially off the shelf. But those systems only strengthen "situational awareness" among a ship's navigation team and are not used for primary navigation, said Capt. Dan Soper, deputy navigator of the Navy.

The ECDIS-N system provides watchstanders with computerized "real time" positions of their ships and all surface contacts, updated several times a second via GPS satellites.

The Navy sets course for the switch to 'paperless navigation'

FRED GREAVES

Chief Quartermaster (SW) Larry Irwin plots a course as the destroyer John Young leaves San Diego on July 24.

D. KEVIN ELLIOTT

Quartermaster 1st Class George Saxton and Lt. j.g. Doug Pegher work at the Sperry-Litton Voyage Management System console on the bridge of the cruiser Monterey. The VMS provides electronic chart and radar information.

Training to start in September

Special training is imminent for 24 quartermasters and operations specialists who will teach the rest of the fleet how to operate the official electronic-navigation system.

Starting in September, the sailors, all from fleet training centers, will begin training at the Coast Guard's Command and Control Engineering Center in Portsmouth, Va.

In turn, those two dozen new instructors early next year will train about 150 navigators and navigation team members from the fleet on 36 simulators in Norfolk, Va; San Diego; Pearl Harbor; Ingleside, Texas; and Yokosuka, Japan.

Those sailors will come from 38 ships with the George Washington and Abraham Lincoln carrier battle groups, the Belleau Wood and Saipan Amphibious Ready Groups, a Mine Warfare Readiness Group and assorted individual ships.

Because the Navy has accelerated the planned full implementation of the system into the fleet by three years, to 2004, the schedule will be a busy period for instructors, said Cmdr. Kevin Denham, commander of the Afloat Training Group in Norfolk, Va.

His instructors are among the first group scheduled for training.

Navywide over the next two to three years, electronic navigation training will be phased in at Quartermaster and Operations Specialist "A" schools and Surface Warfare Officer schools, said Capt. Dan Soper, deputy navigator of the Navy.

The Navy's enlisted ranks of 315,000 sailors includes more than 2,300 quartermasters and almost 8,800 operations specialists.

Training also will be incorporated at the Naval Academy and NROTC programs, said Soper.

Changes to navigation practices traditionally have been a delicate subject. In 1998, Naval Academy alumni helped scuttle a plan to reduce a celestial navigation course.

Now, just as when the academy was established in 1845, midshipmen are taught how to use a sextant. But these days, the course includes a computer to help turn a star sighting into a fix.

Last fall, the principles of electronic navigation were included in the Advanced Navigation class, said Royal Navy Lt. Cmdr. Richard Pethybridge, acting chairman of the academy's Department of Seamanship and Navigation.

This summer, midshipmen used a laptop-mounted navigation system on the bridge of yard patrol boats during their East Coast cruise.

Nevertheless, said Pethybridge, "It's unlikely we'll do away with paper charts." □

The charts are stored on CD-ROMs in an ECDIS-N component called Digital Nautical Chart that allows navigation team members to call up those that they need for everything from an ocean transit to a port call. They can set the scale of the chart to zoom in or out as needed. In all, 5,000 charts are available on 29 disks.

The navigators enter the starting and ending points of a planned transit, and the "voyage management system," another component of ECDIS-N, plots a track.

The system includes safety feature add-ons, such as an alarm if

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FIRST IN THE FLEET

Navigation teams from the carrier George Washington and Abraham Lincoln battle groups will be the first in the fleet to receive training on the Navy's new electronic navigation system.

Ships and submarines scheduled to deploy with the Washington:

George Washington, CVN 73
Normandy, CG 60
Monterey, CG 61
Barry, DDG 52
Laboone, DDG 58
Mahan, DDG 72
Arthur W. Radford, DD 968
Kauffman, FFG 59
Supply, AOE 6
Annapolis, SSN 760
Oklahoma City, SSN 723

Saipan Amphibious Ready Group:
Saipan, LHA 2
Austin, LPD 4
Ashland, LSD 48

Ships and subs scheduled to deploy with the Lincoln group:

Abraham Lincoln, CVN 72
Shiloh, CG 67
Valley Forge, CG 50
Fletcher, DD 992
Paul Hamilton, DDG 60
Camden, AOE 2
Two Los Angeles-class fast-attack submarines, names not released.

Belleau Wood Amphibious Ready Group:
Belleau Wood, LHA 3
Denver, LPD 9
Mount Vernon, LSD 39

Also to be trained, four out of six Mine Warfare Readiness Group ships, including:

Pioneer, MCM 9
Pelican, MHC 53
Champion, MCM 4
Heron, MHC 52

Ships deploying individually or as part of exercises and to be included in the training:

Milius, DDG 69
Higgins, DDG 76
O'Bannon, DD 987
Samuel Eliot Morison, FFG 13
John L. Hall, FFG 32
Crommelin, FFG 37
McCluskey, FFG 41
Simpson, FFG 56
Tortuga, LSD 46

Navigator of Navy gets fix on revolution

Rear Adm. Richard D. West remembers the moment he knew he wanted to help bring electronic navigation Navywide, ASAP.

West, navigator of the Navy, visited the Coast Guard icebreaker Healy during its port visit in Baltimore last year.

The newly commissioned ship was getting ready for a journey through the Northwest Passage, transiting from the East Coast of the United States to Seattle through the icy waters north of Canada.

The Healy is outfitted with an Integrated Bridge System, which gives the crew the ability to navigate electronically, without paper charts.

"I knew we needed this capability in all of our Navy ships," he said.

Adm. Vern Clark, chief of naval operations, had just added the navigator of the Navy position to West's responsibilities as oceanographer of the Navy in January.

West's mission: establish navigation standards, identify information technology improvements and serve as a technical adviser for the implementation of "paperless" navigation Navywide.

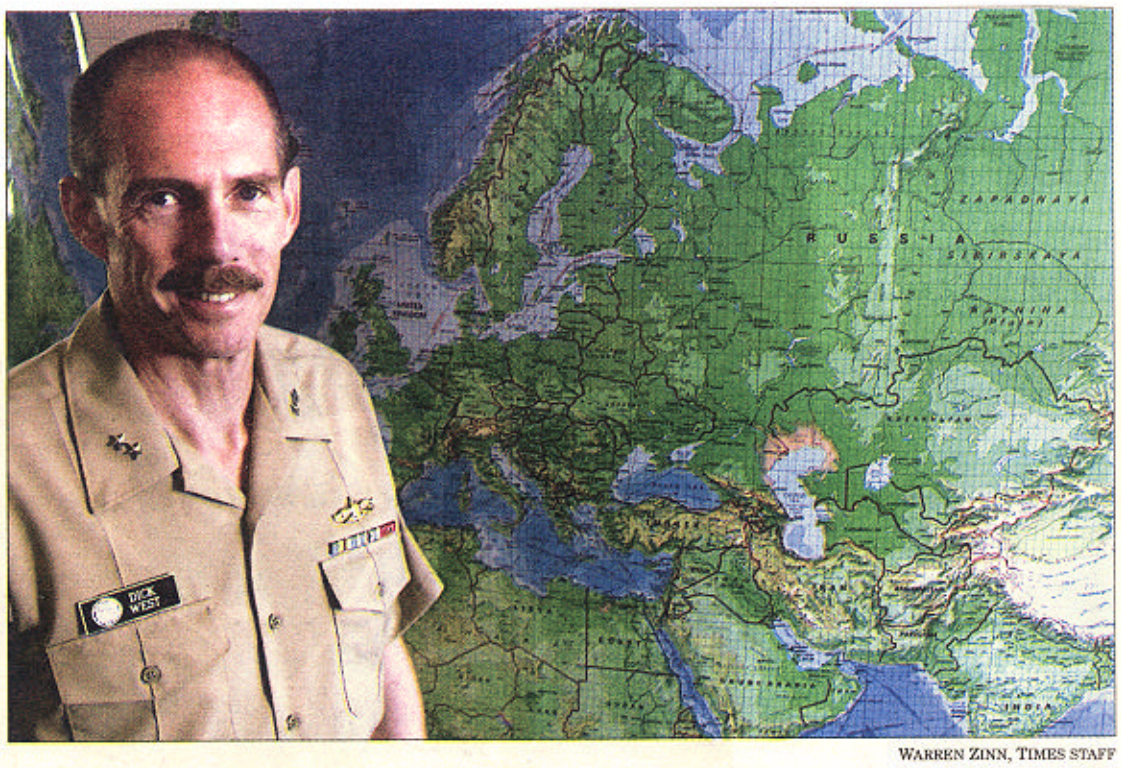
The promises of an electronic navigation system include more accurate tracking and reduced manning of navigation teams.

West said that a navigator of the Navy, a post not in operation since held by Lt. Matthew Maury in the mid-1800s, will help the service consolidate and update its capabilities to meet current needs.

"The work was kind of spread around, which is probably the reason we fall behind in navigation technology," he said.

An NROTC graduate from the University of Rochester, N.Y., West says he remains a surface warfare officer at heart.

He's commanded three ships during his career, the salvage ship Opportune, guided-missile frigate McInerney and guided-missile cruiser Leahy. West also served as navigator aboard two other ships.



WARREN ZINN, TIMES STAFF

Rear Adm. Richard West, navigator of the Navy, says his background motivates him to find the best navigation system.

He said his SWO background makes him want to ensure that the electronic navigation system the Navy buys into works well for fleet users.

"I think my background ... personally motivates me to make sure we have the right system out there and the right capabilities," he said.

West and his staff work out of the Naval Observatory in Washington, D.C. .

Despite all the technological advances coming for navigation, West said practical experience out on the ocean still is key for navigators.

"It's not all automatic, there's still a lot of art to being a good seaman and a good navigator," he said. □

PLOT TWIST

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a ship veers off an assigned track. A bounty of information on navigational features, such as buoys and lighthouses, will be available on screen at the click of a mouse — part of 12 "layers" of information electronically embedded in the program.

Navigators aboard the Ticonderoga-class Monterey are learning how to work the system, which was incorporated as part of a recent "Smart Ship" overhaul. So far, they like what they see.

"When we actually make the shift, it will save a lot of time," said Quartermaster 1st Class (SW) George Saxton.

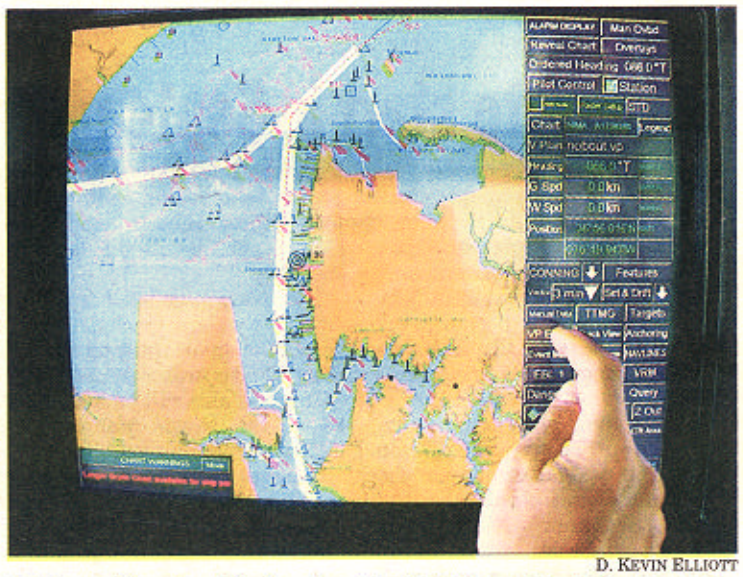
He said the system has enabled the ship to slash the navigation team from five members to two.

The Monterey's skipper, Capt. Bill Walsh, not only likes the reduced manning and timely navigation features but also the system's potential usefulness in war fighting, particularly in coastal waters.

"The closer we get to the bad guys, the more critical our navigation is," Walsh said.

He also likes the way the same navigation information can be viewed on several screens aboard ship, including one in his sea cabin.

"All of the key decision-makers will be on the same sheet of music at the same time," he said.



D. KEVIN ELLIOTT

The Voyage Management System aboard the Monterey provides electronic chart and radar information on a touchscreen.

Ship's navigator Lt. j.g. Doug Pegher likes the system but believes the Navy should continue to teach the sextant-and-chart basics.

"You have to walk before you can run," he said.

The plot thickens

Chief Quartermaster (SW) Larry Irwin, underway aboard the destroyer John Young off the coast of San Diego, couldn't agree more.

"People lose their skills if they don't use them and won't know celestial navigation," he said. "You tend to get lackadaisical with computers. You become complacent."

Irwin said he was worried that sailors would not know what to do in an emergency.

"If we rely too much on electronics and lose power, it could be a disaster," he said.

Another worrisome scenario, Irwin said, is the ship taking a missile strike or other blow that knocks out the computers. Without the ability to use a sextant and gauge location by getting a bearing on the sun on the horizon, sailors will be lost, he said.

For now, Irwin can stow that concern. A move to reduce sextant training at the Naval Academy in 1998 created such an uproar that the Navy backed off and continues to teach the skill.

'If we rely too much on electronics and lose power, it could be a disaster'

CHIEF QUARTERMASTER
LARRY IRWIN
DESTROYER JOHN YOUNG

To concerns that Navy ships relying solely on paperless navigation would be high and dry if ECDIS-N was for any reason knocked out, Soper said the system will include at least one and possibly two independent electronic-chart back-ups designed to activate automatically in an emergency.

Right now, the John Young carries two copies of every chart — there are about 6,000 charts needed for a WestPac deployment. If the John Young were sent to the Mediterranean, Irwin said he would have to request still more charts for that area.

"It's time-consuming," said Irwin, but it's better to take along what you need than find out after the ship is aground that you should have had one more chart.

Getting the system under way

The Navy's plan calls for initially installing Digital Nautical Chart aboard the 38 ships of the carrier Abraham Lincoln and George Washington battle groups and others before they deploy next year.

The battle groups' navigators still will use traditional paper chart-based navigation but will try out electronic navigation, too, Soper said.

The deployments and the time after will serve as an evaluation period for the system, said Soper, the deputy navigator of the Navy.

"They'll go out and use them ... and come back and help us make a better system," he said.

Before it can be employed as a primary navigation system, ECDIS-N will undergo a certification process that will take a look at how well it functions, the training provided and proficiency of users.

Then the fleet commanders in chief will decide on whether to go paperless and rely entirely on electronic navigation.

Soper said that, despite the increased capabilities that electronic navigation offers, there's no substitute for basic seamanship skills. All in all, electronic navigation will not mean an end to groundings, collisions and other mishaps, Soper said, but it should help reduce the toll.

"It will pay for itself many times over in ships not damaged and lives not lost. ... It makes them less likely, but it doesn't keep you from making mistakes." □

Reporter Darlene Himmelspach contributed to this report from San Diego.